SCIENTIFIC PRODUCTION ON THE REPRESENTATION OF MUSEOLOGICAL OBJECTS INDEXED IN WEB OF SCIENCE: a bibliometric analysis (2012-2022)

A PRODUÇÃO CIENTÍFICA SOBRE A REPRESENTAÇÃO DE OBJETOS MUSEOLÓGICOS INDEXADA NA WEB OF SCIENCE: uma análise bibliométrica (2012-2022)

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Abstract: This study presents a scientometric analysis of the representation of museological objects in the international scientific literature. It employs a dual quantitative-qualitative approach, combining bibliometric analysis, domain analysis, and content analysis. Data from the Web of Science Core Collection were used, spanning from 2012 to 2022, and tools such as EndNote x20, Biblioshiny, and VOSviewer. The scientific production over time shows an initial stability in research output from 2012 to 2016, followed by a marked increase from 2017 onwards. The analysis of 491 retrieved documents reveals that 40 authors are the elite contributors in museological studies, revealing the field's global significance. Integration of information science with museology is evident in the retrieved works, reflecting an interdisciplinary approach. Finally, the research concludes that online access to museum collections is still a challenge for most museums, underscoring the importance of assignment of metadata and semantic enrichment.

Keywords: Bibliometric analysis; Co-word analysis; Museological objects representation; Scientific production analysis.

Resumo: Este estudo apresenta uma análise cientométrica da representação de objetos museológicos na literatura científica internacional. Adota uma abordagem dual quantitativa-qualitativa, combinando análise bibliométrica, análise de domínio e análise de conteúdo. Foram utilizados dados da Web of Science Core Collection, abrangendo o período de 2012 a 2022, e ferramentas como EndNote x20, Biblioshiny e VOSviewer. A produção científica ao longo do tempo mostra uma estabilidade inicial na produção de pesquisas de 2012 a 2016, seguida por um aumento acentuado a partir de 2017. A análise de 491 documentos recuperados revela que 40 autores são os principais contribuintes nos estudos museológicos, evidenciando a relevância global do campo. A integração da ciência da informação com a museologia é evidente nas obras recuperadas, refletindo uma abordagem interdisciplinar. Por fim, a pesquisa conclui que o acesso *online* às coleções de museus ainda é um desafio para a maioria dos museus, destacando a importância da atribuição de metadados e do enriquecimento semântico.

Palavras-chave: Análise bibliométrica; Análise de co-palavra; Representação de objetos museológicos; Análise da produção científica.

1. Introduction

Most museums articulate their own methods for describing and representing their objects. With the arrival of new semantic technologies, a series of mechanisms are implemented to integrate the resources on the Web and provide information about museum objects.

The relationship between information science and museology is a crucial element of this study. Information science focuses on the organization, management, and dissemination of information, while museology focuses on museums, collections, and their societal roles. These fields intersect areas like information management within museums, archival practices, and the digitisation of collections.

This facilitates the development of innovative and more expressive forms of information representation. By intertwining semantic technology methods, a more precise and logically structured sense of the network of interrelated information is achieved. This approach can be leveraged to uncover new knowledge and interconnect data generated and maintained across varied contexts, facilitating the linkage of museum collection objects and enhancing their representation.

In the museum domain, metadata facilitates the establishment of meaningful connections, offering context to the objects and uncovering their historical trajectories. “Museum curators use metadata as a way to interpret collections, conveying to visitors artifacts’ historical and societal significance, as well as describing the relationship of objects to one another” (RILEY, 2017:5).

Therefore, ensuring the clarity of metadata standards, as mentioned by Simionato *et al.* (2017), is crucial for preserving data integrity and preventing ambiguity, as well as avoiding decontextualised and incomplete representations. Although the guidelines propose a diversity of perspectives for analysing and describing aspects of informational objects, enriched with the establishment of complex conceptual relationships, the adoption of a basic metadata scheme already supports a certain level of standardization and interoperability (Silva & Lara, 2021).

Concerning museums, metadata tools implemented since the 1970s and late 90s include: data value standards, such as: Art & Architecture Thesaurus (AAT) and ICONCLASS; data structure standard like: Categories for the Description of Works of Art (CDWA), in addition to CDWA Lite XML (eXtensible Markup Language) schema, and data content standard including: Cataloguing Cultural Objects (CCO), Lightweight Information Describing Objects (LIDO), Spectrum; and the primarily conceptual framework in the field of museums and cultural heritage: CIDOC Conceptual Reference Model (GILLILAND-SWETLAND, 2017).

Schemes, standards, and models developed for representation in the Semantic Web must be grounded in interdisciplinarity. Oldman *et al.* (2015) accentuate that numerous information systems store significant data lacking explicit meanings. This poses a challenge for experts in information representation or documentalists, who without the help of experts in the domain cannot grasp how the information should be accurately represented.

According to Marcondes (2019), registration and documentation are essential prerequisites for the museumization process. In this context, the Getty Institute recommends a minimum standard of description fields for museum objects, known as Object ID. This standard ensures unambiguous identification of each object and includes one or more images (THORNES *et al.*, 1999).

Cardozo-Padilha and Arruda-Café (2017) emphasise that semantic interoperability challenges in museum cataloguing arise from the use of different terms for the same metadata or overly broad concepts, leading to ambiguity and requiring additional effort from users and researchers to navigate the terminological inconsistencies. To address this, it is essential to develop an information structure that integrates all resources describing the objects, utilising a standardised language that enables the categorization of elements as shared members of a specific group or category.

In this sense, Silva (2021) indicates that among the specific cataloguing guidelines for art objects are the Categories for the Description of Works of Art (CDWA) and among the tools for indexing art objects, the Art & Architecture Thesaurus (AAT). Furthermore, Klic *et al.* (2018) state that normalising terms using Getty's AAT helps to reconcile the many variants as well as various inconsistencies in the source data of a work or source. Based on this, it can be considered that metadata facilitates and speeds up searches, helping to integrate all resources under a much more standardised vision.

The complexities arise from the unique characteristics of each museum and the diverse typology of objects, making the subject more intricate. Thus, there is a need for mapping the scientific production in this field, aiming to identify gaps in museum studies and explore possibilities through the application of interdisciplinary methods to approach the representation of information of objects in museums.

Given this, the research question is as follows: What do bibliometric analyses reveal regarding publication performance, trends and predominant themes and co-words networks? The objective is to conduct a bibliometric analysis of the representation of museological objects in international scientific literature, aiming to describe the behaviour of publication activity, identify predominant keywords, uncover research trends and map co-words network. An overview of publications on museological information representation was developed, aiming to improve the accessibility, management, and retrieval of information related to museum objects within their collections.

1.2. Museological objects representation

Essential elements in fields like museology and information science include conceptual accuracy, specialised language, and methods for information retrieval and preservation. Bräscher-Medeiros and Arruda-Café (2008) presented the role of information representation as both an intrinsic aspect of the information organisation process. Specific languages, such as classifications, thesauri, taxonomies, and ontologies, emerge as integral components in representing museological objects. UNESCO (2009) defines museological objects as part of cultural heritage, including artifacts, monuments, and sites with symbolic, historical, and social significance. This study focuses on museological objects as part of cultural heritage.

Standardisation and structuring of descriptions in museums are essential for representing objects in the digital era, as noted by Batista-Lima *et al.* (2016). Harpring (2016) emphasises the importance of glossaries, thesauri, and specialised dictionaries for language standardisation.

Museum professionals infer valuable information from objects, addressing gaps through research and analysis, often requiring detailed documentation fields to capture aspects like an object's stylistic evolution. Metadata represents diverse museum resources and allows interoperability among cultural heritage collections. Fortier and Ménard (2017) note that online access to collections remains a challenge, and many museums still use inconsistent metadata practices. Scherp *et al.* (2012) argue that existing metadata models and standards often lack compatibility and sufficient semantic richness to describe museum collections effectively.

2. Methodology

This research comprises three core strategies: bibliometric analysis, domain analysis, and categorical content analysis. Bibliometric method (GLÄNZEL, 2003) was employed to analyse and map the museological representation scientific subdomain, focusing on measurement and analysis of published scientific literature that aims to uncover research trends, emerging and predominant topics and co-words networks. In addition, Bardin's categorical content analysis (1977), adhering to the rules of exhaustiveness, representativeness, homogeneity, and relevance was used, to guide the inclusion criteria for sample selection and its in-deep analysis. On the other hand, Hjørland's domain analysis (2002) allowed a better understanding of the relationships between disciplines within the studied domain, which enriched the interpretation of intellectual dynamics findings and aligned them with the theoretical foundations of knowledge organisation.

2.1. Data collection and search strategy

The Web of Science Core Collection (WoS) international database was selected for this research due to its advantageous classification system in the library and information science discipline, which enables the precise retrieval of articles related to museological objects representation. The following search strategy was adopted: "museological collection" (Topic) OR "museum collection" (Topic) OR "museum objects" (Topic) AND "metadata" (Topic), also refined to only retrieve documents categorised as Proceeding Paper, Review Article, Book Chapter, Data Paper, or Articles for the period 2012-2022. The search, conducted on 10/10/2023, retrieved 491 items.

2.2. Bibliometric indicators

Bibliometric indicators of publication activity, along with advanced data-analytical methods (GLÄNZEL, 2003) were applied. The total number of publications, paper frequency by year, to enabled the identification of research activity peaks between 2012 and 2022; elite of researchers, based on Price's Law (1976), which states that the square root of the total number of authors in a field corresponds to those prolific authors; core, moderately and minimally productive journals, following Bradford's Law (1934), that provided a well-established framework for understanding the distribution of scholarly contributions across different zones.

2.2.1. Co-word clustering technique

A co-word analysis was conducted to map the conceptual structure and visualise complex bibliometric data, facilitating the interpretation of connections between author's keywords (ARIA and CUCCURULLO, 2017). This analysis emphasised dominant topics and sub-topics, as well as identified under-researched areas and emerging trends that may point to future directions for the museological field.

2.3. Co-word clustering technique

In the first step, a robust process for the identification of noun phrases within the author's keywords is employed. This involves the application of standardising the data using EndNote x20 software (CLARIVATE..., 2024). This process included removing duplicates,

ensuring the quality of records for bibliometric analysis, managing document references more efficiently, and facilitating the content analysis of abstracts, which was essential for grasping the wider context of the research landscape. Biblioshiny, the graphical interface of the R-package 'bibliometrix' (ARIA and CUCCURULLO, 2017), was used for its robust bibliometric data management and analysis capabilities. To map the conceptual structure a co-word analysis was developed, with a unit of analysis (author keywords).

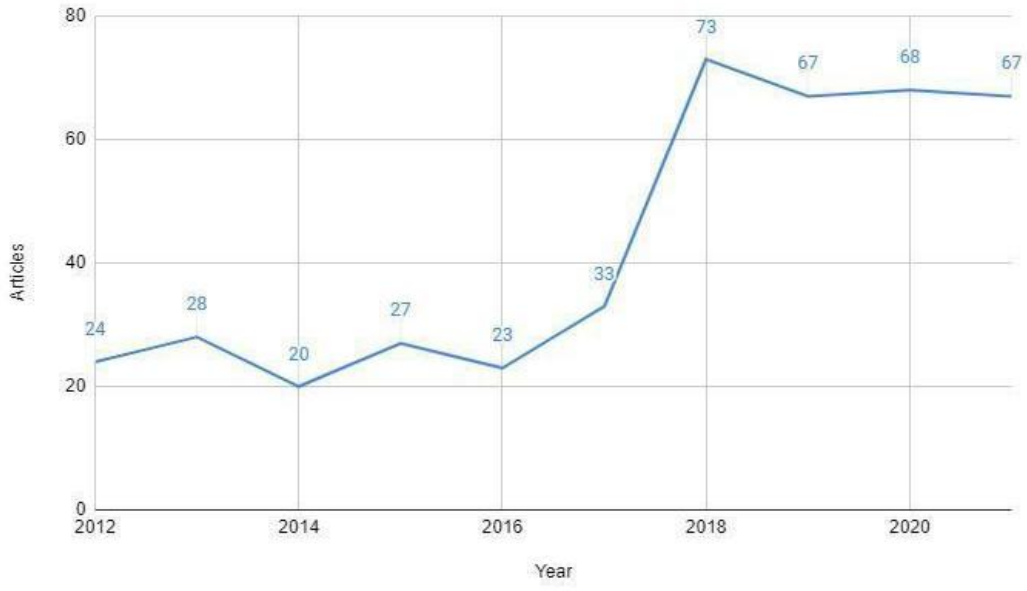
Finally, drawing on the methodology by Bornmann *et al.* (2017), was used a function to create a network based on the co-occurrence of authors' keywords (adjectives or nouns). This network was represented on a two-dimensional map.

3. Results

3.1. Scientific productivity

The temporal distribution of publications in museological objects representation research from 2012 to 2022 is displayed in Fig. 1. This visualisation maps the number of publications per year, providing growth trends within the field over the specified period.

Fig. 1 - Annual scientific production

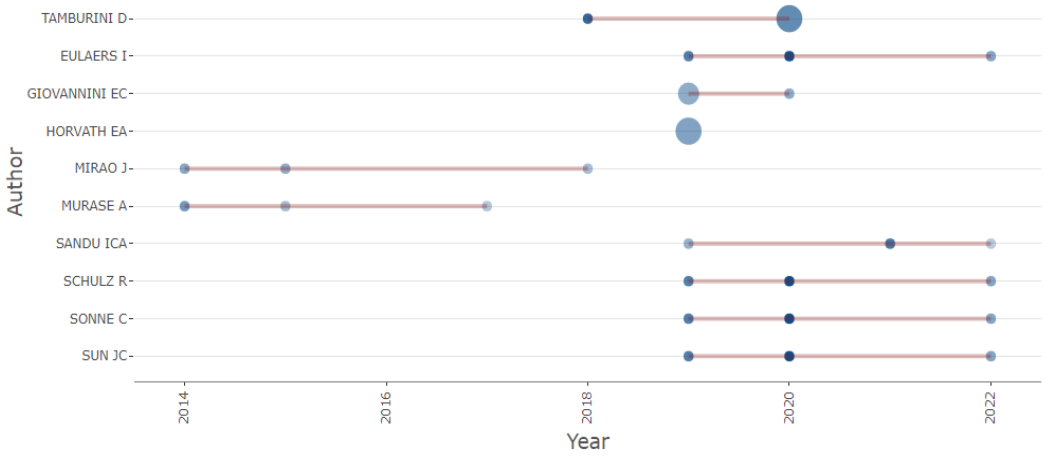


Source: elaborated by the authors (2024).

From 2012 to 2016, publication numbers remained stable, ranging from 20 to 28 articles per year, indicating a steady research output. However, after 2017, a notable increase occurred, with publications rising to 33 in 2017 and surging to 73 in 2018. This upward trend continued through 2021, maintaining high annual output of 67 to 73 articles. Despite a 15.03% annual growth rate, the later years show growing interest and development in the field.

Furthermore, the analysis of the 1,573 authors' production over time (Fig. 2) reveals the diverse and dynamic nature of scholarly contributions to museological representation studies. In this visualisation, the colour intensity and circle size indicate authors' scholarly and productivity. The size of the circles reflects the number of articles published each year, with larger circles signifying higher productivity.

Fig. 2 – Authors' production over time



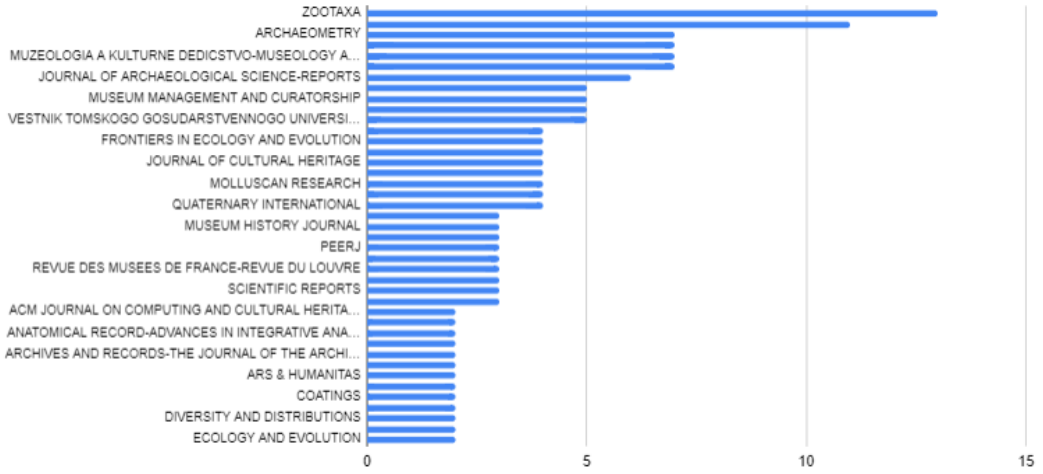
Source: elaborated by the authors (2024).

The elite or most prolific contributors of the field of museological studies are 40 (√1,573 ≈ 40). Fig. 2 only shows the ten authors with the highest frequency of publications. Tamburini D, with 4 publications, has the highest number of publications in the domain, followed by several authors with 3 publications each, such as Sandu ICA, Eulaers I, Giovannini EC, and Horvath EA.

Some publication frequencies show variations across years. For example, Eulaers I maintained a steady output, with one publication each in 2019, 2020, and 2022. Giovannini EC experienced a peak in productivity in 2019, with two publications, while Horvath EA's most productive year was 2019 with three publications. Mirao J's contributions were spread across 2014, 2015, and 2018, while Murase A made a notable contribution with a single publication in 2014. These trends reflect the research output dynamics within the broad and collaborative field of museological studies.

The analysis of source production, applying Bradford's Law (1934) to the retrieved documents, identified a total of 341 sources. This distribution (Fig. 3) underscores a concentrated core of highly productive sources (Zone 1) that contribute a disproportionately large share of articles. Beyond this core lies a broader category of moderately productive sources (Zone 2) and an extensive group of minimally productive sources (Zone 3). Quantitatively, Zone 1 comprises 41 sources (12.02% of the total), Zone 2 includes 138 sources (40.47%), and Zone 3 encompasses 162 sources (47.51%).

Fig. 3 - Core sources in Zone 1 by Bradford's Law



Source: elaborated by the authors (2024).

This distribution reveals the hierarchical nature of source productivity within the dataset, revealing the dominance of a select core over more extensive but less prolific segments. A comprehensive description of these findings is provided below:

Core Journals (Zone 1): Zootaxa (13), Zookeys (11), Archaeometry (7), Heritage Science (7), Museology (7), A Kulturne Dedicstvo-Museology and Cultural Heritage (7) and PLOS ONE (7). According to Bradford's Law (1934), Zone 1 comprises core journals and represents the backbone of the research landscape. They are likely to be central to the research topic and collectively account for a substantial number of articles.

Moderately Productive Journals (Zone 2): journals listed from Vestnik Tomskogo Gosudarstvennogo Universiteta to Scientific Reports fall into Zone 2. They are moderately productive and contribute to the overall body of literature, but to a lesser extent than the core journals.

Minimally Productive Journals (Zone 3): the remaining journals. Individually, these journals contribute with fewer articles than those in Zones 1 and 2. Zone 3 represents a long tail of less influential sources that, collectively, contribute with a smaller proportion of articles.

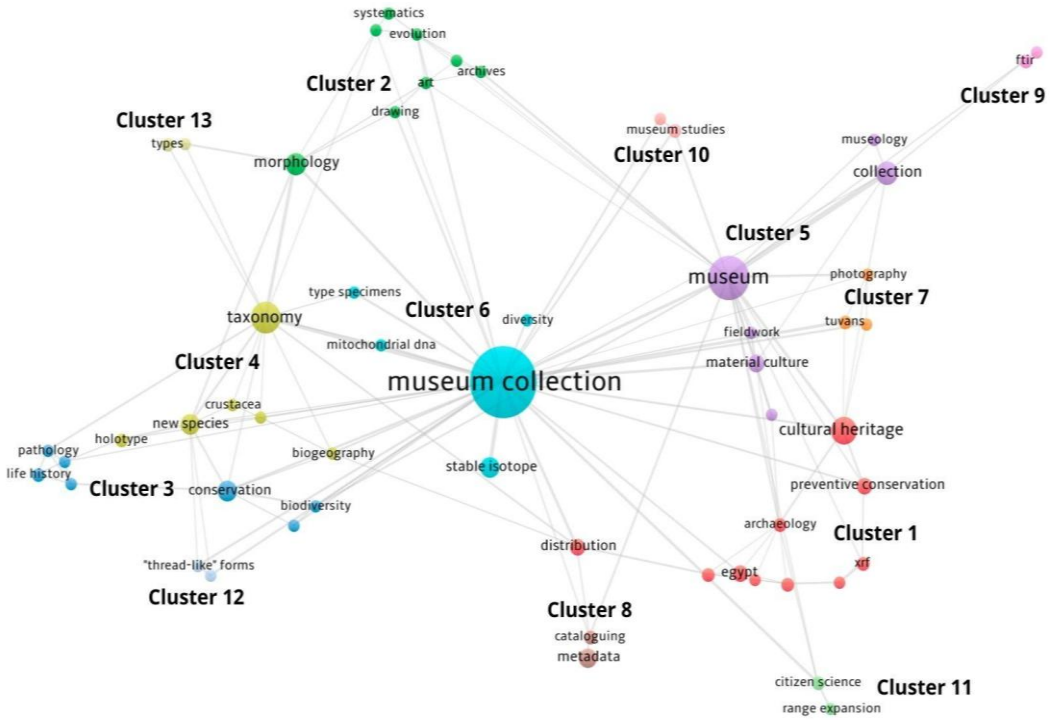
The distribution is consistent with Bradford's Law (1934), indicating a geometric growth in the number of sources in the three zones. The sources in Zone 1 reveal a diverse array of source types, reflecting a comprehensive engagement with various disciplines, including natural sciences, cultural heritage, environmental studies, and more. The presence of multidisciplinary and specialised journals underscores the richness of the core sources in this group, confirming the concentration of productivity in certain sources.

3.2. Conceptual structure

Co-word network (Fig. 4) is structured in 13 clusters and 57 nodes, and each cluster represents a specific thematic area within museology and related disciplines. The node size

corresponds to the item's weight; for instance, a keyword that appears more frequently will have a larger node. Each cluster represents a set of keywords that are often related. The colour coding helps to visually separate different clusters (themes or subject areas within the research subfield). Also, it is important to observe the distance between nodes in the map; nodes that are closer are more related and the lines indicate a relationship between them.

Fig. 4 - Co-word network



Source: elaborated by the authors (2024).

The following analysis prioritises the perspective of this research, focusing on those clusters most closely aligned with information science and museological representation practices, following the criteria of cluster's size, its position in the network, and co-occurrence frequency of the nodes. There are six key clusters (1, 5, 6, 8, 10, and 11) that offer in-depth understanding about metadata management, cataloguing, and museum studies. While other clusters (2, 3, 4, 7, 9, 12, and 13) are relevant to the broader field, they represent more specific case studies related to natural history, conservation, analytical techniques, and specific biological classifications. To facilitate analysis and improve thematic identification, generic categories (indicated in parentheses) were assigned to each cluster, allowing a clearer understanding of the themes and topics represented within each group of related scientific works.

In cluster 6 (5 nodes) (Museum Collections and Metadata) there is a focus on museum collection as a dominant topic. Emerging themes like metadata and cataloguing reveal a shift toward improving accessibility and organization within museum systems. The focus on metadata and cataloguing practices reflects the critical role of data management in enhancing the usability of collections. Wehi *et al.* (2012) emphasise the critical need for

robust metadata systems, discussing how biases in museum collections can distort research outcomes. Hardenbroek *et al.* (2012) and Chatterjee *et al.* (2015) rely on isotopic analyses to connect specimens to shifts in climate and water quality. Metadata can standardise the documentation of these associations, facilitating reliable longitudinal and cross-regional comparisons. The inclusion of provenance information is essential for precise interpretation. Migaszewski and Mader (2019) discuss the significance of maintaining historical and geological context when examining rose-like calcite slabs from Poland, noting that a metadata framework helps preserve and make these details accessible. Focusing on museum collections and metadata, the importance of systematic documentation and data integration is emphasised. This approach not only enhances the reliability of research but also supports innovative analyses and boosts the educational and societal value of museum collections. Ultimately, preserving unique specimens relies on precise documentation.

Cluster 5 (6 nodes) (Museology and Material Culture) includes key topics like museum and material culture that emphasise traditional themes, while fieldwork and collection suggest emerging topics focused on practical aspects of museum work. The appearance of museology as a topic indicates a growing interest in theoretical discussions about the role and function of museums in contemporary society. The cluster's themes suggest a balanced approach, blending theoretical considerations with practical challenges in the field. Grant (2022) investigates the intersections between material culture, museum collections, and their wider sociocultural and historical contexts. Tidy and Turner (2020) offer a framework for understanding museums as active agents in the socio-political dynamics of coloniality, advocating for the use of intimacy as a methodological approach in field research.

In cluster 1 (10 nodes) (Archaeology and Heritage Studies), research primarily focuses on representation of cultural objects through a variety of analytical methods. Key topics include archaeology, cultural heritage, and specific techniques such as radiocarbon dating. Emerging topics like iconography are related to spatial analysis and visual heritage representation. Felippi, Rüthschilling and Perry (2018) details preventive conservation efforts for textile collections, emphasising in documentation and cataloguing. Furthermore, Micoli *et al.* (2019) underscores the significance of situating objects within their cultural and ritual contexts, advocating for context-specific metadata that includes both technical details and interpretative information. The focus on Egypt and preventive conservation reflects growing concerns for preservation in regions with rich archaeological histories.

Within cluster 8 (2 nodes) (Cataloguing and Metadata Management) a set of connections is explored, delving into topics, such as cataloguing and metadata, accentuating a critical role of systematic organization and documentation in museum practices. These emerging themes demonstrate a transition towards exploring the challenges of digital preservation and access. The cluster underscores the importance of metadata management as museums adapt to the demands of modern research and public engagement, emphasising cataloguing as essential for maintaining and enhancing collections in the digital age (WESTERBY and KEEGAN, 2019).

In cluster 10 (2 nodes) (Museum Studies and Collecting) there is a focus on museum studies and collecting as key themes. These topics underscore the dual emphasis on theoretical frameworks and practical elements of museum practice. Collecting activities reveals a response to the dynamic nature of these institutions and their role in preserving cultural and scientific heritage (CLARK *et al.*, 2018; HRUSKOVÁ, 2020; KOS, 2020).

Cluster 11 (2 nodes) (Citizen Science) is related to public participation in museums research, practices and technical processes, commonly known as citizen science (SPEAR, PAULY and KAISER, 2017; ENCARNAÇÃO *et al.*, 2022). This emerging area emphasises the democratisation of scientific knowledge and the engagement of non-specialists in contributing to museological and scientific initiatives.

Although the other clusters contribute significantly to the studied field, they focus on more specialised case studies. Cluster 4 (Taxonomy and Biogeography) focuses on species classification and geographic distribution, emphasising taxonomy and new species (MITA and ROSA, 2019; WILLIAMS and SNYMAN, 2021). Cluster 2 (Natural History and Evolution) explores species diversity and evolutionary adaptations, with growing interest in mollusks and biodiversity (WESENER and ANILKUMAR, 2020). Cluster 3 (Conservation and Ecology) emphasises ecosystem health and conservation strategies, underscoring the critical role of museum collections in studying life cycles, comparative anatomy, developmental biology, life history hypotheses, and providing valuable perspectives on taxonomic variation, environmental context, and ecological dynamics (MCRAE and ARONSEN, 2018). Cluster 7 (Photography and Ethnography) integrates cultural narratives and visual media, accentuating the documentation, preservation, and analysis of photographic negatives, while underscoring the need for systematic classification and field-based documentation, which align with the cluster's focus on biodiversity and conservation strategies (STANULEVICH, 2020). Cluster 9 (Analytical Techniques) applies advanced scientific methods for object's analysis, including from gemstones and mummies to paintings and historical tools (VANDENBEUSCH *et al.*, 2021). Cluster 13 (Diptera and Type Specimens) represents foundational taxonomic research (AMORIM and OLIVEIRA, 2013), and Cluster 12 (Marine Biology) bridges natural history and marine biodiversity, reflecting museology's interdisciplinary scope while emphasising the role of museum collections in filling knowledge gaps, refining species representation through taxonomic revision, and deepening the ecological understanding of marine systems (HORVATH, 2019).

Finally, it is important to mention that, although all these analysed studies are related to the domain of metadata, only a limited number focus on a theoretical proposal for creating metadata schemes or descriptors as a central theme. In this sense, Qarabolaq *et al.* (2012), studied the standard PREMIS preservation metadata, developed using XML to record metadata for maintaining information resources in digital packages, has a determining role in optimal information management in virtual museums.

The main metadata standards used by virtual museums are presented by Sylaiou *et al.* (2018), along with the qualitative results of an extensive survey conducted within the framework of the ViMM project to identify the strengths and weaknesses of the metadata standards most commonly used. Rezende, Ferreira and Manini (2019) provided a definition for descriptors (metadata) used to index 50 objects from the museum collection, focusing on the typology of natural history, the field of morphological sciences, and the specialty of human anatomy.

A conceptual model that connects metadata to communication processes, thereby enabling a more systematic treatment of metadata, is presented by Konsa (2020). The introduction of structured metadata in Estonian museums began in 1992, when KVIS (Information System of Cultural Values) was developed by AS GenNet Laboratories under the commission of the Ministry of Culture. The development of KVIS was based on the CIDOC

data model of the International Council of Museums and SWETERM, the Swedish standard for forming name attributes. This object-oriented data model focused not on the object but on the event, a description approach also supported by the CRM (Conceptual Reference Model) adopted by CIDOC.

Silva and Lara (2021) propose a basic metadata scheme for the descriptive representation of artworks in Brazilian museums, drawing from international guidelines to create a framework suitable for the Brazilian context. They examined three key standards for the descriptive representation of museum objects: the SPECTRUM guidelines from Collections Trust in the United Kingdom; the CIDOC-ICOM Categories of Information, associated with UNESCO, and the CDWA, developed by the Getty Research Institute in the United States. Based on these guidelines, a concrete metadata scheme was developed as a methodological guide for the basic descriptive representation of artwork collections in Brazil.

Metadata profiles adopted for displaying archival and museum objects in the Common Digital Space of Scientific Knowledge (CDSSK), with one of the prototypes being the digital library "Scientific Heritage of Russia" (DL SHR), were discussed by Kalenov *et al.* (2021). Also, two cases from museums in the USA (the Smithsonian Transcription Center and the National Gallery of Art collection on Wikimedia Commons) about vocabulary in museum collection practices were investigated, which feature opposite participatory strategies for enriching images with metadata, were investigated by Hansson and Dahlgren (2022).

4. Conclusions

This study underscores the role of museological objects representation within the broader context of cultural heritage, emphasising the need to improve standardisation and enhance description in the digital era. While metadata is recognised as a vital tool for optimising interoperability and providing essential information about museum resources, current practices are still insufficient to fully capture the semantic richness of these objects. However, this research presents a significant advancement by unveiling the integration of information science with museology, as discovered through topic clusters identified in the content structure analysis.

The scientific production over time shows an initial stability in research output from 2012 to 2016, followed by a marked increase from 2017 onwards. On the other hand, the analysis of authors' production reflects the diversity in scholarly contributions. The application of Price's Law identifies the most prolific authors, with Tamburini D leading. Individual publication patterns of these authors reveal varying rhythms of research output, indicative of the dynamic nature of the field.

Distribution of sources within the dataset reveals a hierarchical distribution of research productivity, with core journals like Zootaxa and PLOS ONE accounting for the majority of articles, in line with Bradford's Law. Moderately productive journals contribute to the literature to a lesser extent, while minimally productive journals have a smaller individual impact. The core journals reflect a diverse, multidisciplinary engagement, confirming the concentration of research in a select group of sources.

Co-word map illustrated a rich and complex interconnected content structure in the study of museological objects representation. The interaction between clusters focused on the

natural sciences, humanities, and social sciences, along with the centrality of themes such as museum collections, material culture, and information management, demonstrates the inherently interdisciplinary nature of this field of study. Additionally, topics such as photography and citizen science were also emphasised in this analysis.

Integration of information science with museology is evident in the retrieved works (QARABOLAQ *et al.*, 2012; SYLAIOU *et al.*, 2018; REZENDE, FERREIRA and MANINI, 2019; KONSA; 2020; SILVA and LARA, 2021; KALENOV *et al.*, 2021; HANSSON and DAHLGREN, 2022) of the topic clusters identified in the content structure analysis. Topics like metadata management, digital curation, and the use of advanced technological tools for artifact analysis underscore a paradigm shift in museum practices. The emphasis on metadata, particularly in the context of digital libraries and virtual museums, signifies the importance of efficient information organisation and accessibility in preserving museum collections.

Findings reveal a strong interdisciplinary focus within the scientific discourse. However, focus remains on preservation-centric practices rather than on enriching the descriptions of museum objects. Additionally, there is a lack of semantic metadata integration with unstructured content. This gap in the literature presents an opportunity for future research.

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